

Claims:

1. A method of measuring slope efficiency for a laser device (102), the method comprising the steps of:
 - 5 altering (200) a modulation current signal for driving the laser device; tapping a predetermined amount of electromagnetic radiation generated by stimulated emission in response to the modulation current signal; measuring (202) the power of the tapped predetermined amount of electromagnetic radiation; characterised by the steps of:
 - 10 controlling (302) the attenuation of untapped electromagnetic radiation; and calculating (204) the slope efficiency using knowledge of the alteration of the modulation current signal and the measured power of the tapped predetermined amount of electromagnetic radiation.
- 15 2. A method as claimed in Claim 1, wherein the magnitude of the modulation current signal is altered by at least about 5% of the magnitude of the modulation current signal prior to alteration thereof.
3. A method as claimed in Claim 2, wherein the magnitude of the modulation
 - 20 current signal is altered by between about 5% and about 10% of the magnitude of the modulation current signal prior to alteration thereof.
4. A method as claimed in any one of the preceding claims, wherein the
 - 25 modulation current signal is altered by providing the modulation current signal with a sinusoidal component, the frequency of the sinusoidal component being below a data rate for communicating data using the modulation current signal.
5. A method as claimed in any one of the preceding claims, further comprising the steps of:
 - 30 measuring (300) the power of the attenuated untapped electromagnetic radiation; and

controlling (302) the attenuation of the untapped electromagnetic radiation in response to the measurement of the attenuated untapped electromagnetic radiation.

- 5 6. A method as claimed in any one of Claims 1 to 4, wherein the step of attenuating the untapped electromagnetic radiation further comprises:

attenuating the untapped electromagnetic radiation by a predetermined amount.

- 10 7. A method of measuring a threshold current point for a laser device, the method comprising the method of measuring slope efficiency as claimed in any one of the preceding claims, and further comprising the step of:

using the calculated slope efficiency to calculate the threshold current point.

- 15 8. A method of controlling a bias current for a laser device, the method comprising the steps of:

measuring the threshold current point in accordance with the method of measuring the threshold current point as claimed in Claim 7; and

20 adjusting the bias current in response to the measured threshold current point.

9. A method of controlling a modulation current signal for a laser device, the method comprising the steps of:

25 measuring the slope efficiency in accordance with the method of measuring slope efficiency as claimed in any one of Claims 1 to 6; and

adjusting (206) the modulation current signal in response to the measured slope efficiency.

- 30 10. A method of controlling an extinction ratio for a laser device, the method comprising the method of controlling the bias current as claimed in Claim 8 and/or the method of controlling the modulation current signal as claimed in Claim 9.

11. A slope efficiency measurement apparatus for a laser device (102), the apparatus comprising:

a modulation current driver unit (110) coupled to a control unit (114), the control unit (114) being arranged to control alteration of a modulation current signal generated by the modulation current driver unit (110);

a tap (134) for tapping a predetermined amount of electromagnetic radiation generated by stimulated emission in response to the modulation current signal;

a power measurement unit (140) for measuring the power of the tapped predetermined amount of electromagnetic radiation; characterised by:

an attenuator (122) for attenuating untapped electromagnetic radiation; and the control unit (114) being arranged to calculate the slope efficiency using knowledge of the alteration of the modulation current signal and the measured power of the tapped predetermined amount of electromagnetic radiation.

12. An apparatus as claimed in Claim 11, wherein the control unit is arranged to alter the magnitude of the modulation current signal by at least about 5% of the magnitude of the modulation current signal prior to alteration thereof.

13. An apparatus as claimed in Claim 12, wherein the control unit is arranged to alter the magnitude of the modulation current signal by between about 5% and about 10% of the magnitude of the current signal prior to alteration thereof.

14. An apparatus as claimed in any one of Claims 11 to 13, wherein the control unit (114) is arranged to alter the modulation current signal by providing the modulation current signal with a sinusoidal component, the frequency of the sinusoidal component, when in use, being below a data rate for communicating data using the modulation current signal.

15. An apparatus as claimed in any one of Claims 11 to 14, further comprising: a further power measurement unit (156) for measuring power of the attenuated untapped electromagnetic radiation; and

the control unit (114) is further arranged to control attenuation of the untapped electromagnetic radiation in response to the measurement of the attenuated untapped electromagnetic radiation.

- 5 16. An apparatus as claimed in any one of Claims 11 to 14, wherein the control unit (114) is further arranged to attenuate the untapped electromagnetic radiation by a predetermined amount.

- 10 17. A threshold current point measurement apparatus for a laser device (102), comprising:

the slope efficiency measurement apparatus as claimed in any one of Claims 11 to 16, and wherein:

the control unit (114) is further arranged to calculate the threshold current point using the calculated slope efficiency.

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18. A bias current control apparatus for a laser device, comprising:
the threshold current point measurement apparatus as claimed in Claim 7;
and

20 a bias current driver unit (106) coupled to the control unit (114); wherein:
the control unit (114) is arranged to adjust a bias current generated by the bias current driver unit (106) in response to the measured threshold current point.

19. A modulation current control apparatus for a laser device, comprising:
the slope efficiency measurement apparatus as claimed in any one of
25 Claims 11 to 16; and wherein:
the control unit (114) is further arranged to adjust the modulation current signal in response to the measured slope efficiency.

- 30 20. An extinction ratio control apparatus for a laser device, comprising the bias current control apparatus as claimed in Claim 18 and/or the modulation current control apparatus as claimed in Claim 19.